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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

WILSON, MICHAEL H

ART UNIT

PAPER NUMBER

1786

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/577,160	Applicant(s) TSUBOYAMA ET AL.	
	Examiner MICHAEL WILSON	Art Unit 1786	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 April 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,8,16 and 17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2 and 8 is/are rejected.
- 7) ☒ Claim(s) 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 27 April 2010 has been entered.

Response to Amendment

2. This Office action is in response to Applicant's amendment filed 27 April 2010, which cancels claims 14 and 15, amends claim 2, and adds new claims 16 and 17.

Claims 2, 8, 16, and 17 are pending.

Claim Objections

3. Claims 8 and 17 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. While the limitation recited in claims 8 and 17 are different than the limitations of claims 2 and 16 the do not further limit the independent claims because they merely recite an inherent

property of the recited copper complexes. The copper complexes in claims 2 and 16 will inherently meet the requirement of claims 8 and 17. Other complexes which would not meet the limitations of claims 8 and 17 are also outside the scope of claims 2 and 16.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 2 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Igarashi et al. (US 2001/0019782 A1) in view of Yam et al. (Photophysics and photochemical reactivities of organocopper(I) complexes. Crystal structure of $[\text{Cu}_2(\text{PPh}_2\text{Me})_4(\mu, \eta^1\text{-C}\equiv\text{CPh})_2]$).

Regarding claims 2 and 8, Igarashi et al. disclose a light emitting device comprising an organic layer between a pair of electrodes with a first organic layer (hole

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transport layer) between the anode and the light-emitting layer and a second organic layer (electron transport layer) between the cathode and the light-emitting layer ([0137] and [0169]). The reference also discloses the light-emitting material in the light-emitting layer is doped in to a host material [0169]. However the reference does not explicitly disclose a copper dimmer complex as light-emitting material.

Yam et al. teach a luminescent binuclear copper(I) complex, $[\text{Cu}_2\{2\text{-C}(\text{SiMe}_3)_2\text{C}_5\text{H}_4\text{N}\}_2]$ (compound 2, page 2889). The reference teaches the complex emits light in the solid state at both room temperature and 77K (page 2890, first column, lines 31-33). The reference also teaches the Cu...Cu distance of 2.4 angstroms (page 2890, first column, lines 5-6) and that the copper ions are monovalent (page 2889, first paragraph).

It would be obvious to one of ordinary skill in the art at the time of the invention to try combining the copper dimmer complex of Yam et al. with the light-emitting layer of Igarashi et al. One of ordinary skill in the art would reasonably expect such a combination to be suitable given that Igarashi et al. teaches phosphorescent metal complexes to be suitable [0013] and Yam et al. teach the copper dimmer complex to be phosphorescent.

Allowable Subject Matter

7. Claim 16 is allowed.
8. The following is a statement of reasons for the indication of allowable subject matter:

While Yam et al. (Photophysics and photochemical reactivities of organocopper(I) complexes. Crystal structure of $[\text{Cu}_2(\text{PPh}_2\text{Me})_4(\mu, \eta^1\text{-C}\equiv\text{CPh})_2]$) teach the copper complex $[\text{Cu}_2\{2\text{-C}(\text{SiMe}_3)_2\text{C}_5\text{H}_4\text{N}\}_2]$ (complex 2) the reference does not teach the copper complex of instant claim 16. The reference does not teach or suggest modifying the complexes of Yam et al. nor give any guidance to one of ordinary skill in the art to arrive at the copper complex of claim 16.

Response to Arguments

9. Applicant's arguments filed 27 April 2010 have been fully considered but they are not persuasive.

Applicants argue unexpected results and cite Examples 10 and 11, having luminescent layers formed using exemplary compound 1007 with a thickness of 20 nm and different concentrations (% by weight) of the copper coordination compound, (Ex. 10: 10%; Ex. 11: 100%). The specification shows Examples 10 and 11 achieve luminescence efficiencies of 11.0% and 8.2%, respectively (table 11). The organic EL device (Ex. 10) in which the copper coordination compound in the luminescent layer is in a concentration of 10% exhibited the higher luminescence efficiency and, Applicants assert, demonstrates that organic EL devices using the instant copper coordination compounds as a guest material produce unexpectedly superior results.

However it is unclear why this result is unexpected. The observed change in efficiency is easily predicted and expected by concentration quenching, a common phenomena in luminescence. Applicants note in the specification that the claimed

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copper complexes are resistant to concentration quenching but there is no evidence that concentration quenching is not a factor in the luminescence of the copper complexes. The observed luminescence of a complex is reduced when quenching occurs. Quenching rate constants are often determined by a Stern-Volmer analysis. Applicant's explanation for the lower luminescent efficiency of Ex. 10 does not appear to make sense. If the copper is being oxidized to copper(II) wouldn't the layer's luminescence decay over time and not exhibit stable luminescence as observed by Applicants (specification [0110])? The electrochemical conversion from copper(I) to copper (II) would more likely effect the stability of the layer instead of the luminescent efficiency. Copper(II) complexes are non-luminescent thus as more of the layer is converted from copper (I) to copper(II) the layers luminescence would be expected to degrade.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL WILSON whose telephone number is (571) 270-3882. The examiner can normally be reached on Monday-Thursday, 7:30-5:00PM EST, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on (571) 272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 1786

MHW